3/11/92

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INTEROFFICE MEMORANDUM

DATE: March 4, 1992

File No.: 840.1 & 765.7

TO: W.C. Henderson

FROM: K.R. Tarbert KRT

SUBJECT: EG&G Rocky Flats Solar Pond/Pondcrete Stabilization Project
Brown & Root Job No. JR-1198

REFERENCE: Addendum to Trip Report of Dec. 4, 1991
Teledyne Readco Continuous Mixer Test (Rev. 1)

INTRODUCTION

The Standard 5" Teledyne Readco Continuous Mixer (TRCM) was tested on November 19 and 20, 1991 in York, PA. (Refer to Trip Report IOM to W.C. Henderson dated Dec. 4, 1991.) The following tests were performed on the surrogate mixed products from the TCRM (per IOM's to J.R. Zak dated Oct. 21, 1991 and Dec. 18, 1991):

Penetrometer tests
Specific gravities
polished cross sections with photo micrographs

PENETROMETER TESTS

Penetrometer tests were performed on all the mixed product surrogate samples on January 16, 1992, approximately 8 weeks after the samples were produced. A Soiltest, Inc. Pocket Penetrometer Model CL-700 was used. Each mixed product sample tested greater than 4.5 tons/Ft² (62.5 psi) except for one of the multiple samples collected from run BR27. It is felt that this sample did not contain the right amount of cement (most likely due to faulty cement feeder) and therefore did not get hard. The feeders were recalibrated during the second day of testing and it was found that only the cement feeder was out of calibration. The clay feeder, salt feeder and water meter were properly calibrated.

0348CE

PHOTOMICROGRAPHS AND SPECIFIC GRAVITIES

Photomicrographs of polished cross sections from selected samples are shown in Exhibit I. These photomicrographs show that the TRCM achieved homogeneous mixing. Notice that "craters" appear in the saltcrete samples BR19, BR23 and BR24. These "craters" were formed as a result of the undissolved nitrate salt crystals melting and/or dissolving during dry polishing of the cross sections.

The measured specific gravity (S.G.) for each of the surrogates is listed under the respective photomicrograph. Reported laboratory specific gravity data is attached as Exhibit II. S.G.'s were calculated based upon the concentration of the components. Refer to Exhibit III. The measured S.G. is fairly close to the calculated S.G. for each of the surrogate saltcrete samples. However, there was a much wider difference between the measured and calculated S.G.'s of the surrogate pondcrete samples. This difference could be attributed to the fact that the clay was fed dry to the TRCM and would be expected to swell upon the addition of water; thereby, creating a less dense product. This seems consistent for BR28 and BR26. However, the accuracy of the measured S.G. reported for BR25 is questionable since it was so low (1.0086). The accuracy of the measured S.G. of BR27 is also questionable since it was reported so high (2.0787) and indicates that the final product is more dense than would be expected.

OBSERVATIONS

On Jan. 9, 1992, the samples were inspected for free water. Observations are listed below.

Pondcrete - sealed in jars
Some of the samples of surrogate pondcrete which were in sealed jars showed condensate on the inside of the jars. Some of these samples (BR25) actually contained free moisture on the top of the sample (~ 1/32"), yet appeared to be very hard. Some samples contained white crystals on top which could be scraped off easily.

Pondcrete - in sealed bags
These samples were either in chunks or in a single block, all were very hard with no free moisture. However, sample BR25 contained quite a bit of free water but was still very hard.

Saltcrete - sealed in jars
Some samples were growing fuzzy crystals on top, and others were growing wispy crystals; however, all the samples were very hard.

Saltcrete - in jars not sealed
These samples had large flat transparent crystals which appeared to be growing on top. These crystals could be scraped off easily. The samples were very hard.

Saltcrete - in sealed bags
All the samples were extremely hard. Some samples contained no free moisture but did have granular crystals on the surface. Others contained free moisture with crystals on the surface of the slab.

PERCENT FILL

A request was made to explain the test parameter called **Percent Fill** which was reported in the Trip Report. This parameter was measured so that it could be used as a gross indication of the maximum throughput capacity of the TRCM. Since the barrel of the TRCM is not operated 100% full, then, theoretically, if the percent operating volume of the barrel is known for a particular throughput, then a projected maximum throughput can be extrapolated for the barrel operating at 100% full. For instance, if the **Percent Fill** for a particular run was reported as 50%, then this indicates that the theoretical maximum throughput capacity could be twice that which was reported at 50% full.

Percent Fill was estimated by emptying the contents of the mixer at the end of a test run into an empty barrel and then weighing it. Knowing the weight of the contents and using an estimated bulk density, a volume can then be calculated. Ratioing the volume calculated to the total volume of the barrel yields a **Percent Fill**.

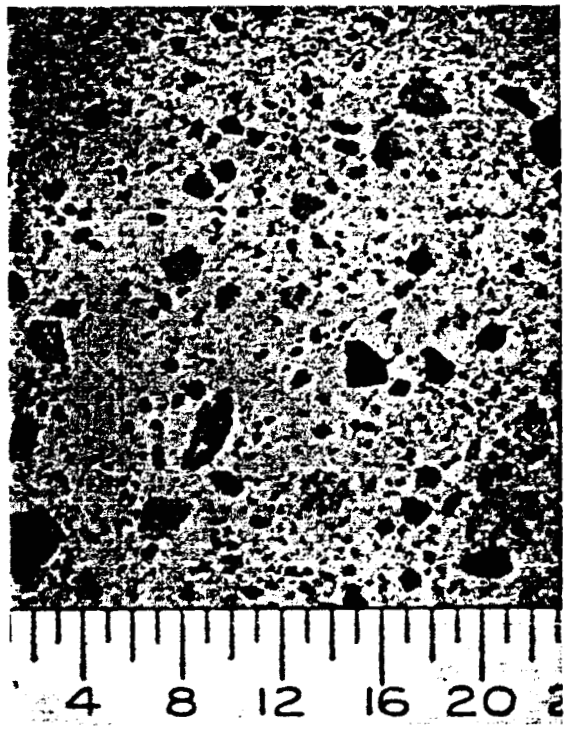
The estimated bulk density used to calculate the **Percent Fill** for the clay surrogate mixed product was 75 #/Ft^3. **Percent Fill** was not calculated for the Salt mixed products.

cc: JRZ PCD JDA
MAM JHT
DAP YMM
BJY LMO

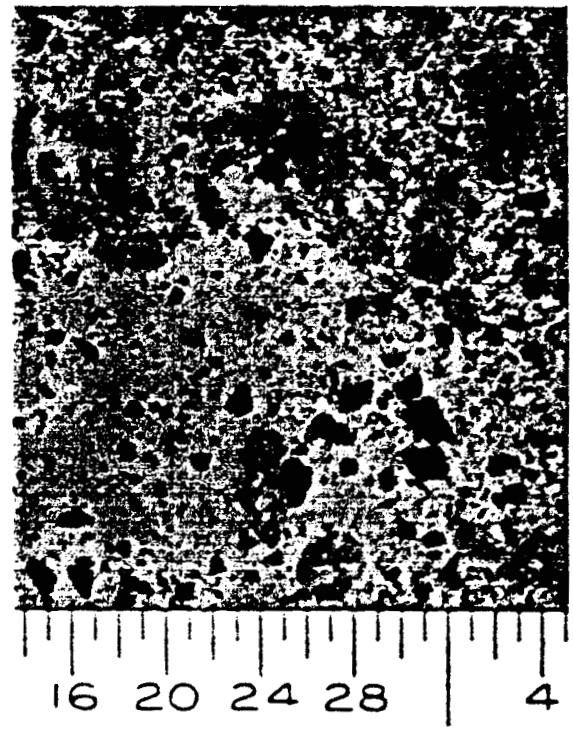
EXHIBIT I

PHOTO MICROGRAPHS
SURROGATE TEST PROGRAM
TELEDYNE READCO CONTINUOUS MIXER TEST

Photomicrographs were taken of polished sections from selected samples of surrogate stabilized waste product. The samples were produced in the Teledyne Readco Continuous Mixer using surrogate pondcrete or surrogate saltcrete, cement and water. A dry ground brick clay mix was used as a surrogate material for pondcrete. A 75% sodium nitrate and 25% sodium sulfate salt mixture was used as a surrogate saltcrete feed for the tests. The photomicrographs shown below demonstrate that the Teledyne Readco Continuous Mixer can produce homogeneously mixed product.



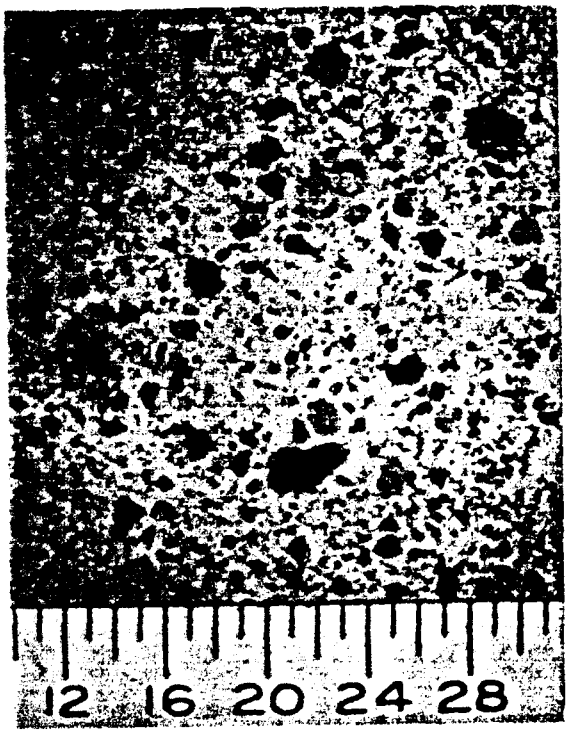
BR 28
Formula 1
60% Clay
20% Water
20% Cement
7.2 tons/hr
S.G. 1.7333
Magnification 4.3x



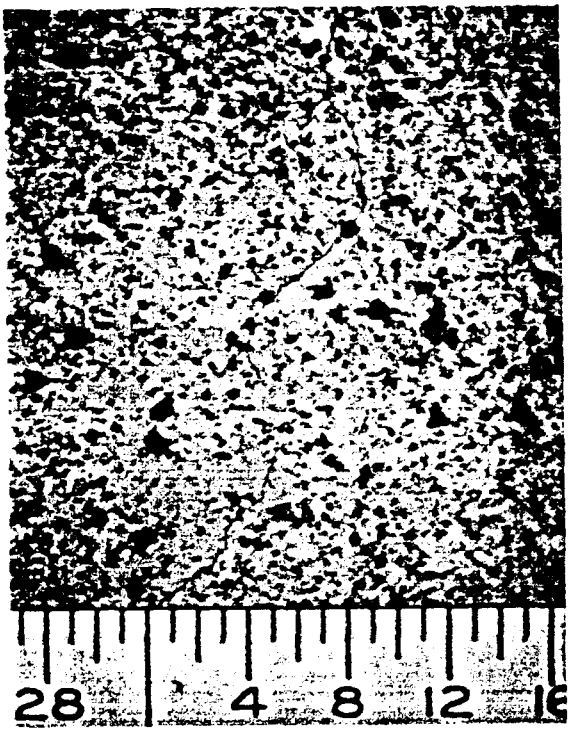
BR 27
Formula 2
50% Clay
33% Water
17% Cement
6.5 tons/hr
S.G. 2.0787
Magnification 3.9x

Note: Ruler shown has 1/32" graduations magnified as stated.

PHOTO MICROGRAPHS
SURROGATE TEST PROGRAM
TELEDYNE READCO CONTINUOUS MIXER TEST



BR 26
Formula 3
50% Clay
25% Water
25% Cement
6.2 tons/hr
S.G. 1.6297
Magnification 4.1x

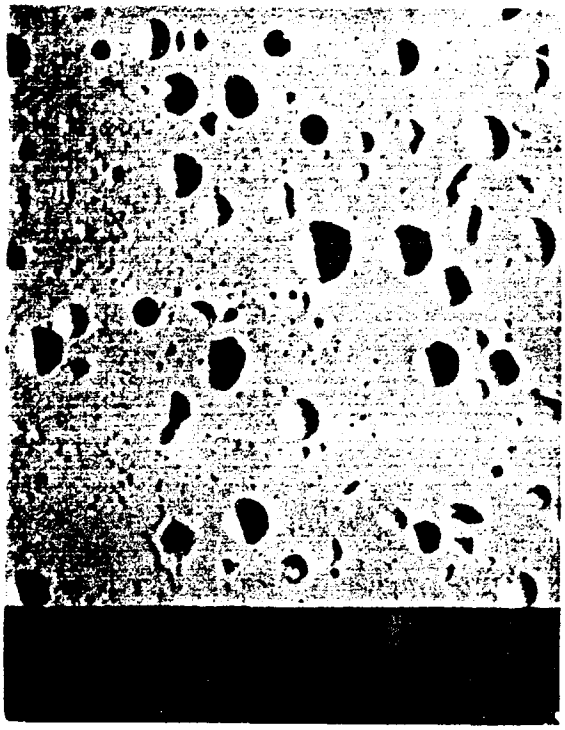


BR 25
Formula 4
33% Clay
33% Water
33% Cement
9.7 tons/hr
S.G. 1.0086
Magnification 4.1x

Note: Ruler shown has 1/32" graduations magnified as stated.

PHOTO MICROGRAPHS
SURROGATE TEST PROGRAM
TELEDYNE READCO CONTINUOUS MIXER TEST

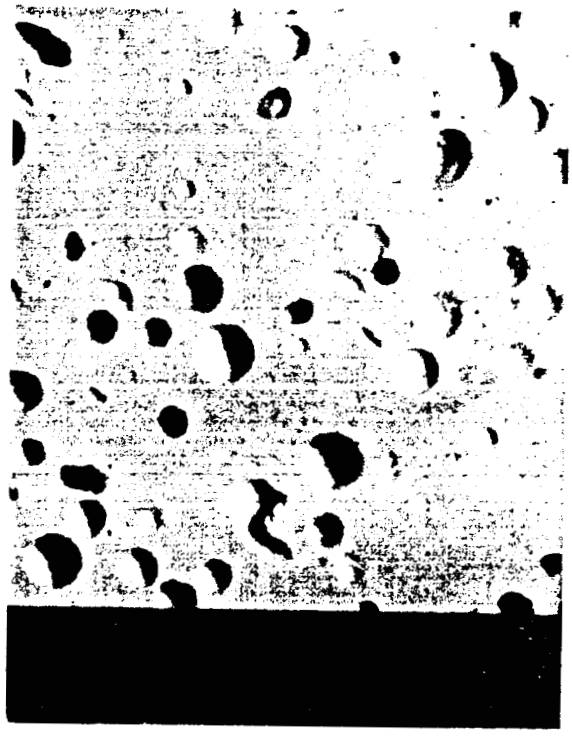
BR 19
Formula 5
40% Salt
20% Water
40% Cement
5.8 tons/hr
S.G. 2.0277
Magnification 6.5x



BR 23
Formula 6
31% Salt
23% Water
46% Cement
6 tons/hr
S.G. 1.9367
Magnification 4x

Note: Ruler shown has 1/32" graduations magnified as stated.

PHOTO MICROGRAPHS
SURROGATE TEST PROGRAM
TELEDYNE READCO CONTINUOUS MIXER TEST



BR 24
Formula 7
25% Salt
25% Water
50% Cement
9 tons/hr
S.G. 1.8871
Magnification 4.3x

Note: Ruler shown has 1/32" graduations magnified as stated.

EXHIBIT II

EDWARD L. HAILE AND ASSOCIATES, INC.

Chemistry - Metallurgy - Corrosion - NDT

9934 SWEETWATER
P.O. BOX 38523
HOUSTON, TEXAS 77238
TELEPHONE: 713-448-9725
FAX: 713-448-8722

January 31, 1992

John Czerwinski
Brown & Root
3100 Clinton Dr., Bldg. 21
Houston, Texas 77020

Subject: Specific Gravity On Refracting Materials By Displacement

Reference: B&R P.O. No: 182189
H&A Job No: 920133

Dear Mr. Czerwinski:

A specimen is weighted in air. It is then immersed in a liquid (water), its loss of weight upon immerson is determined, and its specific gravity calculated. The specific gravity of the refracting samples are as follows:

Sample	sp gr g/cm2
19	2.0277
23	1.9367
24	1.8871
25	1.0086
26	1.6297
27	2.0787
28	1.7333

If you have any questions or need further assistance please call 448-9725 or fax 448-8722. Thank you.

HAILE AND ASSOCIATES, INC.

Oscar Schomburg
Chief Chemist

OS/sk

EXHIBIT III

COMPARISON OF CALCULATED AND MEASURED SPECIFIC GRAVITIES

	SALTCRETE SURROGATES			PONDCRETE SURROGATES			
SAMPLE NO.	BR19	BR23	BR24	BR25	BR26	BR27	BR28
S.G. calculated	1.9780	1.9410	1.9171	1.7334	1.8930	1.7168	1.9934
S.G. measured	2.0277	1.9367	1.8871	1.0086	1.6297	2.0787	1.7333